

A REVISION OF THE SPECIES OF THE FAMILY PYRAMIDELLIDÆ  
OCCURRING IN THE PERSIAN GULF, GULF OF OMAN, AND  
NORTH ARABIAN SEA, AS EXEMPLIFIED MOSTLY IN THE  
COLLECTIONS MADE BY MR. F. W. TOWNSEND (1893-1900),  
WITH DESCRIPTIONS OF NEW SPECIES.

By JAMES COSMO MELVILL, M.A., D.Sc.

Read 10th June, 1910.

PLATES IV-VI.

It was in 1901<sup>1</sup> that, in collaboration with Mr. R. Standen, I first essayed a catalogue of the Gastropoda of the Persian Gulf and contiguous seas, including, of course, the family a revision of which is the cause of this paper. During the period of over nine years which has elapsed since its publication, a large amount of most valuable and distinguished work amongst the molluscan products of the deep sea has been accomplished; the citing of four or five names amply bear witness to this, e.g., Mr. Charles Hedley on the Australian fauna, Dr. M. M. Schepman on the results of the "Siboga" Expedition to the East Indies, Mons. Ph. Dautzenberg & Fischer<sup>2</sup> on the Mollusca of Annam, Dr. Sturany on Erythræan species, and Dr. W. H. Dall & Mr. Paul Bartsch, recently having given special attention to this family, have published two papers of extreme importance, viz., (1) "A Monograph of West American Pyramidellid Molluscs",<sup>3</sup> (2) "Notes on Japanese, Indo-Pacific, and American Pyramidellidæ".<sup>4</sup> In the first-mentioned treatise about 300 or more species are catalogued, nearly two-thirds of which are new to science, while a more complete subgeneric classification of, especially, the genera *Turbonilla* and *Odostomia* has been essayed. In the latter the chief feature is the figuring, for the first time, of several of Dr. Arthur Adams' Japanese and North Chinese shells of this group.

The student of this fascinating but difficult subject owes an especial meed of gratitude to these authors for having to some extent thrown an effective searchlight over the insufficiently described and unfigured species, without measurements, without detail, which were so profusely given to the world in the early sixties, during Dr. Adams' visit to the East. These papers mainly appeared during the four years 1860-3 inclusive, in the pages of the *Annals and Magazine of Natural History*. It is true the author fixed upon no actual types, and consequently in many instances one can never be quite sure whether the labelling be correct, and whether such specimens should be accepted as the true exponents of the describer's diagnoses.

<sup>1</sup> Proc. Zool. Soc. Lond., 1901, pp. 327-460, pls. xxi-xxiv.

<sup>2</sup> Journ. de Conch., vol. liv, pp. 179-99, 1907.

<sup>3</sup> Smithsonian Inst., U.S. Nat. Mus., Bulletin 68, pp. 1-258, 1909.

<sup>4</sup> Proc. U.S. Nat. Mus., No. 1452, vol. xxx, pp. 321-69, pls. xvii-xxvi, Washington, 1906.

Accordingly the solution of a few of the more tangible species is much to be commended, which, by being well figured and often redescribed, though still, of course, retaining the Adamsian 'cognomina', are thus raised upon a higher platform, and cease to be such severe stumbling-blocks to the student as heretofore. We wish it were possible to place all this author's deep-sea species—between five and six hundred is the total of mostly minute shells—upon as satisfactory a basis.

The affinities of the Persian Gulf and Arabian Sea Pyramidellidæ lie, as might be expected, with those of the Erythræan fauna, while many very similar, but always to be differentiated, exist in the Mediterranean.

In a paper published lately<sup>1</sup> it was found by a tabular comparison that, of 475 species of Mollusca collected during the Stanley Gardiner Expedition in the Amirantes, Seychelles, Cargados, and Chagos Archipelago, all in the South Indian Ocean, but little more than a quarter were known to exist in the Persian Gulf. It has long been my theory that the course of the currents, coupled with the geographical configuration, tend in making the gulf a 'cul-de-sac', and thus the creation of endemic forms is favoured. The exceptionally prolific dredging made at 156 fathoms in the Gulf of Oman in 1903 was not only memorable for the vast amount of new minute forms of shells, for Prof. Sydney J. Hickson, F.R.S., is describing this year a new genus and species (*Pyrophyllia inflata*) of solitary Octoradiate Corals from this locality, and several other similar organisms await differentiation. Many of the fishes, too, procured by Mr. Townsend in the immediate neighbourhood proved new to science.

In the following catalogue I have to some extent adopted the sequence of species as given in the former list. From motives of convenience, the species are placed in alphabetical order, and I have not ventured to subdivide the *Turbonillæ* into sections. I have considered *Pyrgulina* a proper genus as distinct from *Odostomia*; and under *Syrnola* still retain certain elongate Odostomoid forms which some authors would perhaps place in the latter genus. Of six or seven species which have been insufficiently figured, I have taken the opportunity of giving more presentable likenesses, which I trust may be useful. It had been thought that the Eulimidæ might be also included in this paper, as completing the Gymnoglossa, but revision does not seem so necessary here: there are but few additions, and fewer new localities to add or comments to make. Accordingly this idea has not been carried into effect.

I would just add that it is well to recapitulate here the lines of demarcation proposed at first for the limitation of the terms 'Persian Gulf' and 'North Arabian Sea'. While the whole of the Gulf and of the Gulf of Oman is included, only that portion of the Arabian Sea is embraced which lies north of an imaginary line running obliquely from Ras-el-Hadd, south-east of Maskat (Muscat), to Panjim on the Indian coast. This includes not only Bombay and Ratnagiri, but also the Angrias Bank.

<sup>1</sup> Trans. Linn. Soc. Lond., Zoology, ser. II, vol. xiii, pt. vi, pp. 65-138, pl. vi, 1909.

The three subdivisions proposed are as follows:—(1) P.G. The whole Persian Gulf, including the Gulf of Oman, with Maskat and Jask, bordered to the east by long.  $59^{\circ} 48'$  E. (2) M.C. The Mekran Coast of Persia and Baluchistan, between long.  $59^{\circ} 58'$  E. and the River Hab. (3) I. The coast of Continental India, from east of River Hab, abutting on Karachi, say long.  $66^{\circ} 40'$  E., south-east to Panjim, lat.  $15^{\circ} 50'$  N., long.  $74^{\circ}$  E.

In conclusion, I am indebted, now as on many previous occasions, to Mr. Edgar A. Smith, I.S.O., and Mr. Ernest Ruthven Sykes, F.L.S., for aid in the requisite researches. To Mr. Lionel E. Adams I owe perennial gratitude for having, now some time ago, presented me with the series that his uncle, Dr. A. Adams, had retained for his own collection of the Mollusca dredged by him in Japan, which consisted of about 200 to 250 species, accompanied with copies of reprints of all his descriptions. Although a very large proportion of these are unnamed, the collection is of much service in showing the various Far Eastern forms, and with its aid, coupled with those from the same source in the British Museum, I have made many comparisons amongst the Pyramidellidæ.

The great majority of specimens were collected by Mr. F. W. Townsend, but a few were found by Mr. Alexander Abercrombie at Bombay.

### Sect. *Gymnoglossa*.

#### Family PYRAMIDELLIDÆ.

PYRAMIDELLA DOLABRATA (Linn.), var. *TEREBELLOIDES*, A. Adams, sp.

*Obeliscus terebelloides*, A. Adams: Sowerby, Thes. Conch., vol. iii, p. 808, pl. clxxi, fig. 18, 1855.

*Pyramidella dolabrata*, Linn., var. *terebelloides*, A. Adams: Tryon, Man. Conch., vol. viii, p. 300, pl. lxxii, fig. 74, 1886.

*Hab.*—M.C. Charbar, 3–5 fathoms, sand.

I. Karachi, lat.  $26^{\circ} 55'$  N., long.  $57^{\circ} 59'$  E., 37 fathoms.

#### PYRAMIDELLA PULCHELLA, A. Adams.

*Pyramidella pulchella*, A. Adams: Sowerby, Thes. Conch., vol. iii, p. 808, pl. clxxi, fig. 20, 1855.

*Hab.*—P.G. Kishm Island, 6 fathoms, mud.

M.C. Charbar.

I. Bombay (Abercrombie).

By some authors this is considered a *Syrnola*, but the columellar plicæ are two in number.

#### PYRAMIDELLA (LONCHÆUS) MACULOSA, Lamarck.

*Pyramidella maculosa*, Lamarck, Ency. Méth., pl. 452, figs. 1a, b.

*Hab.*—P.G. Off Shaikh Shuaib Island, 7 fathoms, sand, mud, and stones.

I. Karachi.

Tryon (Man. Conch., vol. viii, p. 301) considers *maculosa* and *acus*, Gmel., identical.

## PYRAMIDELLA (LONCHÆUS) SULCATA, A. Adams.

*Pyramidella sulcata*, A. Adams: Sowerby, Thes. Conch., vol. ii, p. 807, pl. clxxi, fig. 34.

*Hab.*—Henjam Island.

Maskat (Muscat), 10–15 fathoms, loose stones and muddy sand.

## PYRAMIDELLA (OTOPLEURA) MITRALIS, A. Adams.

*Pyramidella mitralis*, A. Adams, Proc. Zool. Soc., 1853, p. 177.

*Hab.*—P.G. Kais (or Gais) Island, 5–10 fathoms, coral sand.

M.C. Charbar. Dead specimens.

## PYRAMIDELLA (OTOPLEURA) PROPINQUA, A. Adams.

*Pyramidella propinqua*, A. Adams: Sowerby, Proc. Zool. Soc. Lond., 1853, p. 177; Reeve, Conch. Icon., *Pyramidella*, fig. 22.

*Hab.*—P.G.; M.C.; I., Karachi.

## SYRNOLA AMBAGIOSA, Melvill.

*Syrnola ambagiosa*, Melvill, Proc. Malac. Soc., vol. vi, p. 55, pl. v, fig. 12.

*Hab.*—P.G. Gulf of Oman, lat.  $24^{\circ} 58' N.$ , long.  $58^{\circ} 54' E.$ , 150 fathoms.

A curious shell of sinuous contour, with remarkably blunt and conspicuous heterostrophe nuclear whorls, the opaque internal spiral lineations very marked likewise. It has no ally in this fauna.

## SYRNOLA APERANTA, Melvill.

*Syrnola aperanta*, Melvill, Proc. Malac. Soc., vol. vii, p. 73, pl. vii, figs. 9, 10.

*Hab.*—P.G. Gulf of Oman, lat.  $24^{\circ} 58' N.$ , long.  $56^{\circ} 54' E.$ , 156 fathoms, shell-sand.

With much of the outward appearance of *Eulimella*, especially *E. carmanica*, Melvill.

## SYRNOLA BRUNNEA (A. Adams).

*Obeliscus brunneus*, A. Adams: Sowerby, Thes. Conch., vol. ii, p. 810, pl. clxxi, fig. 35.

*Syrnola brunnea*, A. Adams, Proc. Zool. Soc., 1862, p. 233.

*Hab.*—I. Karachi. Rarely.

## SYRNOLA CINCTELLA, A. Adams.

*Syrnola cinctella*, A. Adams, Ann. Mag. Nat. Hist., vol. vi, p. 333, 1860.

*Hab.*—P.G. Kishm Island, 6 fathoms, mud.

M.C. Charbar.

I. Karachi.

A well-known species of wide distribution. It is reported from Queensland by Hedley.



## SYRNOLA CLAVELLOSA, Melvill.

*Syrnola clavellosa*, Melvill, Proc. Malac. Soc., vol. vii, p. 73, pl. vii, figs. 9, 10.

*Hab.*—P.G. Gulf of Oman, lat.  $24^{\circ} 58' N.$ , long.  $56^{\circ} 54' E.$ , 156 fathoms, shell-sand.

Distinguished by its club-like form, with remarkably large, obtuse, heterostrophe apex.

## SYRNOLA CLEARETE, n.sp. Pl. IV, Fig. 1.

S. testa conico-elongata, supra permultum attenuata, caudata, solidiuscula, nitida, anfractibus 10–12, quorum apicales duo planorbuli, subpellucidi, heterostrophi, cæteris apud suturas inciso-caniculatis, imprimis tarde accrescentibus, ultimo infra peripheriam paullum abbreviato, spiraliter unizonato, zona obscura, rufa, in uno specimine omnino absente, superficie sub lente omni minutissime striatula, apertura subrotunda, labro constricto, columella 1-plicata. Long. 8, lat. 2.50 mm.

*Hab.*—Gulf of Oman, lat.  $24^{\circ} 58' N.$ , long.  $56^{\circ} 54' E.$ , 156 fathoms, shell-sand.

A caudate, *Pyramidella*-like species, with incised canaliculate sutures, solid substance, and attenuate upper whorls. The columella, however, is but once-plaited. Some examples possess a narrow spiral obscure rufous zone round the whorls, in others it is quite absent.

## SYRNOLA ELEGANS, A. Adams.

*Syrnola elegans*, A. Adams: Sowerby, Thes. Conch., vol. ii, p. 808, pl. clxxi, fig. 19.

*Hab.*—M.C. Charbar.

I. Karachi. Dredged amongst muddy sand and shingle, 7 fathoms.

This pretty species occurs at Singapore and in the Philippines, and is evidently of wide distribution throughout the Eastern tropics.

## SYRNOLA KARACHIENSIS, Melvill. Pl. IV, Fig. 2.

*Syrnola Karachiensis*, Melvill, Mem. Manch. Soc., vol. xli, No. 7, p. 12, pl. vi, fig. 9.

*Hab.*—P.G. Mussandam.

M.C. Charbar.

I. Karachi. Amongst weed and mud upon rocks at low tide.

A plain, brown species, uniform in appearance, of which the only ally is the much larger *S. brunnea*, A. Adams.

## SYRNOLA MEKRANICA, Melvill &amp; Standen.

*Syrnola Mekranica*, Melvill & Standen, Proc. Zool. Soc., 1901, p. 390, pl. xxii, fig. 21.

*Hab.*—M.C. Charbar, 7 fathoms.

A graceful white species, with rufous spiral bands. Mr. C. Hedley wrote me not long ago that he had detected a very similar, if not identical, species in Australia.

## SYRNOLA METRIA, Melvill.

*Syrnola metria*, Melvill, Proc. Malac. Soc., vol. ii, p. 112, pl. viii, fig. 16.

*Hab.*—P.G. Bushire.

I. Karachi. At low tide amongst weed and loose rocks.

A small Pyramidelloid with canaliculate whorls and once-plaited columella. It has only, so far, occurred singly.

## SYRNOLA MODICA (A. Adams).

*Pyramidella modica*, A. Adams: Reeve, Conch. Icon., *Pyramidella*, fig. 41.

*Hab.*—P.G. Mussandam, 47 fathoms.

M.C. Charbar.

Seems to co-relate nearest with this species, which has its headquarters in Japan. I also have three specimens in my collection labelled Hong-Kong.

## SYRNOLA MUSSANDAMICA, Melvill &amp; Standen.

*Syrnola mussandamica*, Melvill & Standen, Ann. Mag. Nat. Hist., vol. xii, p. 304, fol. xxii, fig. 1, 1903.

*Hab.*—P.G. Gulf of Oman.

Mussandam, just at the entrance into the Persian Gulf. A beautiful delicate white shell, which perhaps would be considered best relegated to *Styloptygma*, Adams.

## STYLOPTYGMA BEATRIX, n.sp. Pl. IV, Fig. 4.

S. testa gracili, attenuato-fusiforimi, alba, vitrea, subpellucida, delicata, nitida, anfractibus 12-14, quorum apicales duo heterostrophii, vitrei, cæteris undique arcte et delicatissime spiraliter striatis, in speciminibus pluribus ad medium zonula interna obscura præditis, plerumque subventricosis, præcipue medios apud anfractus, duobus ultimis sæpius rectis, ultimo paullum prolongato, apertura oblongo-ovata, labro paullum effuso, margine columellari, præcipue ad basin, squarrose incrassatulo, columella uniplicata.

Long. 9, lat. 2 mm., sp. maj.

„ 6, „ 1.75 „ min.

*Hab.*—Persian Gulf, off Mussandam, at 50 fathoms (April, 1910).

Several examples of a delicate, attenuate, graceful shell, pellucid white, twelve or more whorled, of which certain of the centrally situated ones are more or less tumid, two lowest, however, being almost straight. The surface is uniformly most delicately spirally striate; in the centre of the lower whorls especially, an internal sub-pellucid median band is, in certain lights, observable. Allied to *S. typicum*, Tryon, from the Philippines, but in this species the apical whorls are more rapidly contracted, so as to become almost caudate, and a central sulcus is to be found on the body-whorl. Several examples were dredged, all alike save in size.

## STYLOPTYGMA COMETES, n.sp. Pl. IV, Fig. 3.

S. testa obscure rimata, cylindrica, superne multum attenuato-caudata, lacteo-vitrea, subpellucida, tenuissima, perfragili, anfractibus ad 13, quorum tres apicales bulbosi, clare vitrei, his septem proximis, apud suturas anguste sulcatis, fere rectis, tribus ultimis ventricosulis, omnibus omnino lævibus, apertura parva, subrotunda, labro tenui, columella uniplicata. Long. 6, lat. 1.50 mm.

*Hab.*—Karachi.

A very delicate and fragile shell; indeed, while the type was being examined microscopically it was broken, the opportunity, however, being then taken to examine the internal columellar arrangement, it was found to be strongly once-plaited almost to the apex. The seven mid-whorls are almost straight and uniform, the three lowest ventricose and impressed suturally.

## ACTÆOPYRAMIS AMÆNA (A. Adams).

*Monoptygma amæna*, A. Adams, Proc. Zool. Soc., 1851, p. 223.

*Leucotina amæna*, A. Adams: Melvill & Standen, Proc. Zool. Soc., 1901, p. 452.

*Actæopyramis amæna*, Tryon, Man. Conch., vol. viii, p. 312, pl. lxxiv, fig. 41.

*Hab.*—P.G. and M.C. No exact record.

I. Bombay (Abercrombie).

It is often difficult to differentiate generically between *Leucotina* and *Actæopyramis*. I still think *Leucotina Jaskensis*, Melvill, from the Gulf of Oman, of that genus; but now transfer here, with some hesitation, one or two other species.

## ACTÆOPYRAMIS CASTA (A. Adams).

*Chrysallida casta*, A. Adams, Ann. Mag. Nat. Hist., vol. viii, p. 301, 1861.

*Actæopyramis casta* (A. Adams), Tryon, Man. Conch., vol. viii, p. 314, pl. lxxiv, fig. 45.

*Hab.*—P.G. Bahrein Is.

I. Karachi. Amongst weed, mud, and loose stones at low tide.

Bombay (Abercrombie).

## ACTÆOPYRAMIS FULVA (A. Adams).

*Monoptygma fulva*, A. Adams, Proc. Zool. Soc., 1851, p. 222.

*Actæopyramis fulva* (A. Adams), Tryon, Man. Conch., vol. viii, p. 313, pl. lxxiv, fig. 42.

*Hab.*—I. Bombay (Abercrombie).

Karachi. Amongst dredged shingle. Dead specimens only, but in very fine condition.

## ACTÆOPYRAMIS GAVISA (Melvill).

*Myonia gavisia*, Melvill, Proc. Malac. Soc., vol. ii, p. 112, pl. viii, fig. 26.

*Hab.*—I. Bombay (Abercrombie).

This may, perhaps, be a *Leucotina*. The type is not in very first-class condition.

## ACTÆOPYRAMIS GRATIOSA (Melvill).

*Leucotina gratiosa*, Melvill, Mem. Manch. Soc., vol. xlii, pt. ii, p. 7, pl. ii, fig. 15.

*Hab.*—P.G. Off Shaikh Shuaib Island, 10 fathoms, in semi-fossil condition.

I. Karachi; alive, but very rarely found.

A very elegant, delicate species, and I am not even yet quite sure as to its systematic position.

## ACTÆOPYRAMIS GRANULATA (A. Adams).

*Monopygma granulata*, A. Adams, Proc. Zool. Soc., 1851, p. 222.

*Hab.*—I. Karachi. Only once observed.

## ACTÆOPYRAMIS PSYCHE, Melvill.

*Actæopyramis Psyche*, Melvill, Ann. Mag. Nat. Hist., vol. iv, p. 93, pl. i, fig. 13, 1899.

*Hab.*—I. Karachi.

A fine, elongate, delicate species.

## ACTÆOPYRAMIS SPECIOSA (A. Adams).

*Monopygma speciosa*, A. Adams, Proc. Zool. Soc., 1851, p. 223.

*Hab.*—P.G. Linjah Anchorage.

Another beautiful species that might possibly be transferred to *Leucotina* with equal advantage.

## AGATHA FILIA (Melvill).

*Amathis filia*, Melvill, Mem. Manch. Soc., 1893, p. 8, pl. i, fig. 12.

*Hab.*—I. Bombay (Abererombie). Rare always; in shell-sand.

*Agatha*, A. Ad. (representative type *A. australis*, Angas), has precedence of one year over *Amathis*, A. Ad.

## AGATHA VESTALIS, n.sp. Pl. IV, Fig. 5.

A. testa attenuata, cylindrica, delicata, tenui, pellucente, albo-lactea, perlævi, anfractibus, duobus apicalibus inclusis, vitreis, paullum bulbosis, cæteris ad suturas anguste inciso-impressis, paullum gradatis, ultimo penultimo et antepenultimum anfractum exsuperante, paullum prolongato, apertura oblonga, labro tenui, columella oblique uniplicata. Long. 7, lat. 2 mm.

*Hab.*—Bombay (Abererombie). Commoner than *A. filia*, but specimens are hardly ever found in perfect condition, owing to their fragility.

A pellucid, milky-white *Agatha*, differing from the other Bombay species (*A. filia*, Melvill) in its marked narrowness of whorl in proportion to its length; in most other particulars, e.g. gradation of whorl, transparent consistency, nuclear whorls, and form of mouth, they are almost identical. Several examples, all alike.

Whether *Amathis* be entitled to rank as a genus on its own merits,

as distinct from *Agatha*, A. Ad., is open to some doubt. And also, whether the species of these genera, with *Myonia*, A. Ad. (in part), are best located here or among the Acteonidæ, is uncertain. In my opinion, despite the very oblique columellar plication, *Agatha*, at all events, is best placed near *Actæopyramis*.

ELUSA BRUNNEOMACULATA, Melvill. Pl. IV, Fig. 6.

*Elusa brunneomaculata*, Melvill, Mem. Manch. Soc., No. 7, p. 13, pl. vi, fig. 5, 1897.

*Hab.*—P.G. Dredged in 5 fathoms, sand and mud. Gulf of Oman; Malcolm Inlet (Kubbatt Ghazira), 24 fathoms.

M.C. Charbar, a few specimens only.

I. Karachi, also rare.

This is a remarkably isolated form, and one of the most select of the order. The curious mahogany-coloured dashes on the pure-white ground are very characteristic, and likewise the firm semi-immersed ribs, and most delicate interstitial spiral striations. I prefer, at the present opportunity, giving *Elusa* and also *Syrnola* generic rank, though perhaps it is more correct to consider them subgeneric only to *Pyramidella* in its wide sense.

ELUSA ENELATA,<sup>1</sup> n.sp. Pl. IV, Fig. 7.

T. testa aciculata, nitidissima, albo-vitrea, tenui, anfractibus 11–12, quorum duo apicales planorbuli, inversim heterostrophi, vitrei, perlæves, cæteris apud suturas impressis, inferis fere rectis, undique longitudinaliter costatis, costis lævibus, crassis, interstitiis lævibus, pellucidis, striis internis spiralibus videndis, costis ultimi anfractus circa novemdecim infra peripheriam evanidis, apertura subrotunda, peristomate incrassato, columella excavata, fortiter uniplicata. Long. 5, lat. 1.25 mm.

*Hab.*—Bombay (Abercrombie).

For years I have had this species mixed up unaccountably with *Turbonilla terebrina* in my collection. It came from the same locality, and was perhaps overlooked as possibly being the young state of the larger species. But it is exceedingly distinct, the very shining appearance of crystalline delicacy, thick longitudinal smooth ribs, the interstices being likewise smooth, though the spiral internal lines show through in certain lights, so transparent is its substance. Peristome thickened, columella with one strong plait.

ELUSA STRIGILLATA, A. Adams.

*Elusa strigillata*, A. Adams, Proc. Zool. Soc., 1862, p. 237.

*Hab.*—P.G. Gulf of Oman, Maskat (Muscat), 15 fathoms.

I. Karachi. Amongst stones and mud at very low tides.

<sup>1</sup> ἐνήλατον, a pin.



## ELUSA SUBULATA (A. Adams).

*Pyramidella subulata*, A. Adams, Proc. Zool. Soc., 1853, p. 177.

*Hab.*—I. Lat.  $18^{\circ} 58' N.$ , long.  $71^{\circ} 45' E.$ , 40 fathoms.

An interesting shell, with caudate, narrow, upper and apical whorls. The type is Japanese. It has lately been discovered off Australian coasts and refigured by Hedley. (Proc. Linn. Soc. N.S.W., 1900, p. 504, pl. xxv, figs. 19-21.)

## EULIMELLA ÆÆA, Melvill.

*Eulimella ææa*, Melvill, Journ. Malac., vol. xi, p. 81, pl. viii, fig. 8.

*Hab.*—P.G. Gulf of Oman, lat.  $24^{\circ} 58' N.$ , long.  $54^{\circ} 25' E.$ , 156 fathoms.

Conspicuous for its inversely revolute nucleus and remarkably ventricose whorls.

## EULIMELLA CARMANICA, Melvill.

*Eulimella carmanica*, Melvill, Ann. Mag. Nat. Hist., vol. xii, p. 303, pl. xxi, fig. 14, 1903.

*Hab.*—P.G. Gulf of Oman, lat.  $24^{\circ} 58' N.$ , long.  $56^{\circ} 54' E.$ , 156 fathoms, shell-sand.

## EULIMELLA MAIA, n.sp. Pl. IV, Fig. 8.

*E. testa attenuata, fere recta, lævi, nitida, tenui, alba, anfractibus 11, quorum apicales duo planorbuli, heterostrophi, cæteris novem ad suturas leniter impressis, rectis, ultimo ad basin rotundato, anfractibus supernis unifasciatis, ultimo bifasciato, fascia spirali obscura, rufa, apertura ovata, peristomate tenui, columella superficialiter simpliciter.* Long. 6, lat. 1.20 mm.

*Hab.*—P.G. Gulf of Oman, lat.  $24^{\circ} 58' N.$ , long.  $56^{\circ} 54' E.$ , 156 fathoms, shell-sand.

Most akin to *E. unifasciata* (Forbes) from New England, the Azores, and also the Mediterranean, of which I have specimens collected during the "Porcupine" Expedition. It differs, however, both in form and texture, and likewise in the double spiral zone on the last whorl, there being, as the name would imply, only one such on *E. unifasciata*.

## EULIMELLA GEDROSICA, Melvill.

*Eulimella gedrosica*, Melvill, Proc. Malac. Soc., vol. vi, p. 55, pl. v, fig. 14.

*Hab.*—P.G. Gulf of Oman, lat.  $24^{\circ} 58' N.$ , long.  $56^{\circ} 54' E.$ , 156 fathoms.

A curiously formed little species, with contour somewhat resembling, amongst its congeners, *E. simplex*, Orbigny, or *E. laxa*, Watson. Under a lens it is seen to be very finely microscopically striate. I expect that a separate genus will be found for this, and perhaps *E. ææa* in the course of time, as they differ in so many particulars from the typical species of the genus, of which the next (*Kaisensis*) is a good exponent.

## EULIMELLA KAISENSIS, Melvill. Pl. IV, Fig. 9.

*Eulimella Kaisensis*, Melvill, Mem. Manch. Soc., vol. xlii, No. 4, p. 21, pl. ii, fig. 5.

*Hab.*—P.G. Near Fao, Bushire; Kishm Island, 6 fathoms, mud; Linjah,  $3\frac{1}{2}$  fathoms. The type from Kais (or Gais) Island.

Gulf of Oman, lat.  $23^{\circ} 55' N.$ , long.  $57^{\circ} 48' E.$ ; lat.  $24^{\circ} 5' N.$ , long.  $77^{\circ} 35' E.$ , 205 fathoms. Likewise in the well-known locality at 156 fathoms.

I. lat.  $18^{\circ} 58' N.$ , long.  $71^{\circ} 45' E.$ , 40 fathoms. These last are exceedingly fine specimens, the whorls sometimes attaining sixteen in number and all of ivory whiteness, and great symmetrical regularity.

## EULIMELLA NITIDISSIMA (Montagu).

*Turbo nitidissimus*, Montagu, Test. Br., vol. ii, p. 299, pl. xii, fig. 1.

*Aclis nitidissima* (Montagu), Forbes & Hanley, vol. iii, p. 223, pl. xc, figs. 6, 7.

*Anisocyclus nitidissima*, Monterosato, Bull. Soc. Malac. Ital., vol. vi, p. 72, 1880.

*Hab.*—P.G. Gulf of Oman, lat.  $24^{\circ} 58' N.$ , long.  $56^{\circ} 54' E.$ , 156 fathoms.

I cannot distinguish this from the European shell, and am convinced it is identical. It is found rarely, but generally, round the English, Scotch, and Irish coasts.

## EULIMELLA VENUSTA, Melvill.

*Eulimella venusta*, Melvill, Proc. Malac. Soc., vol. vi, p. 55, pl. v, fig. 14.

*Hab.*—P.G. Lat.  $18^{\circ} 58' N.$ , long.  $71^{\circ} 45' E.$ , 40 fathoms; also at 156 fathoms.

A very graceful species.

## MORMULA MACANDREÆ, A. Adams.

*Mormula Macandreae*, A. Adams, Ann. Mag. Nat. Hist., ser. iv, vol. vi, p. 127.

*Hab.*—P.G. Lat.  $45^{\circ} 55' N.$ , long.  $57^{\circ} 59' E.$ ; lat.  $24^{\circ} 58' N.$ , long.  $56^{\circ} 54' E.$ , 156 fathoms.

M.C. Charbar, 7 fathoms, on rocks.

A very delicate species, conspicuous for its large bulbous nuclear whorls, its pronounced varices, and golden-brown hue. The original type came from the Gulf of Suez (R. MacAndrew Coll.).

## MORMULA PERSARUM, Melvill &amp; Standen.

*Mormula persarum*, Melvill & Standen, Ann. Mag. Nat. Hist., vol. xii, p. 304, pl. xxii, fig. 2, 1903.

*Hab.*—P.G. Gulf of Oman, Maskat (Muscat), at 15 fathoms.

A beautiful and very rare form, allied to the above *M. Macandreae*, A. Ad., but more regular, with fewer and less pronounced varices. Only once dredged hitherto.

## MORMULA RISSOINA, A. Adams.

*Mormula rissoina*, A. Adams, Journ. Linn. Soc. Lond., vol. vii, p. 1.

*Hab.*—M.C. Rare off coast of Baluchistan.

We have seen this peculiar species from the Andaman Isles (G. Booley Coll.).

## TURBONILLA ABERCROMBIEI, Melvill.

*Turbonilla Abercrombiei*, Melvill, Proc. Malac. Soc., vol. ii, p. 114, pl. viii, fig. 7.

*Hab.*—I. Bombay (A. Abercrombie).

A small, elegant, somewhat turreted species, many ribbed, the ribs once gemmulate spirally just below the sutures. Interstices smooth. Not yet found by Mr. Townsend, it probably does not range so far north.

## TURBONILLA ANGUSTISSIMA, Melvill.

*Turbonilla angustissima*, Melvill, Proc. Malac. Soc., vol. vi, p. 55, pl. v, fig. 13, 1904.

*Hab.*—P.G. Gulf of Oman, lat.  $24^{\circ} 58' N.$ , long.  $56^{\circ} 54' E.$ , 156 fathoms.

The narrowest by far of the Eastern species in proportion to its length. The remarkable inverse heterostrophe apex would seem to place it in the sub-genus *Nisiturris*, Dall & Bartsch. The only difference between this and *T. Gabrieli*,<sup>1</sup> Hedley, from 10 fathoms off the Hope Islands, Queensland, seems to consist in the straight longitudinal ribs of the latter as opposed to the slightly oblique ones of *angustissima*, and we should call them extreme forms of one species.

## TURBONILLA BASILICA, Melvill. Pl. IV, Fig. 10.

*Turbonilla basilica*, Melvill, Mem. Manch. Soc., vol. xlii, No. 4, p. 22, pl. i, fig. 9.

*Hab.*—P.G. Lat.  $27^{\circ} 52'$ , 40 fathoms, on Telegraph Cable, Kishm Island, 6 fathoms, mud; Bushire.

One of the rarer forms, the somewhat similar *T. fraterna*, described in this paper, having been confused with it till now. It is somewhat dolioliform, white, small, and shining, smooth at the interstices. *T. sororia* is another ally. The nuclear whorls are not so pronounced as in the last-mentioned, but both might easily be placed as *Nisiturris*.

## TURBONILLA CANDIDA, Folin.

*Turbonilla candida*, de Folin, Fonds de la Mer, p. 207, pl. xxviii, fig. 13.

*Hab.*—P.G. Kishm Island, 6 fathoms, soft mud.

I. Karachi. Amongst rocks covered at low tide with mud, sand, and weeds.

The largest species. Originally described from West Africa.

<sup>1</sup> C. Hedley, Proc. Linn. Soc. N.S.W., vol. xxxiv, pt. iii, p. 449, pl. xlii, fig. 74, 1909.

## TURBONILLA CHARBARENSIS, Melvill &amp; Standen.

*Turbonilla (Pyrgostelis) Charbarensis*, Melvill & Standen, Proc. Zool. Soc., p. 393, pl. xxii, fig. 22, 1901.

*Hab.*—M.C. Charbar. Mekran Coast, 7–10 fathoms.

A compact species, rufous-ochre, ribs not very pronounced, striate at the interstices. Allied to *T. rufa*, Philippi, which is the type of the sub-genus *Pyrgiscus*, Phil., in which it should probably be likewise included.

TURBONILLA COLPODES,<sup>1</sup> n.sp. Pl. V, Fig. 14.

*T. testa pergracili, multum attenuata, alba, parum nitida, solidiuscula, anfractibus 11–12, quorum apicales heterostrophi, planorbuli, læves, nitidi, cæteris ad suturas impressis, ventricosulis, undique longitudinaliter arcuissime costatis, costis crassis, lævibus, oblique flexuosis, ultimum apud anfractum infra peripheriam evanidis, et deinde usque ad basim concentricè sulcato-liratis, interstitiis spiraliter arcte striatis, apertura rotundo-ovata, margine columellari incrassato. Long. 4·50, lat. 1·20 mm.*

*Hab.*—P.G. Off Mussandam, at 50 fathoms; April, 1910.

A small but beautifully sculptured species, of thick substance, proportionately speaking, the longitudinal ribs being obliquely flexuose, with spirally striate interstices; in this latter particular it differs from *T. quæstuosa*, *microperone*, and others possessing oblique riblets, the interstitial spaces being generally smooth in these species.

## TURBONILLA DELIA, Melvill.

*Turbonilla (Pyrgostelis) Delia*, Melvill, Proc. Malac. Soc., vol. vii, p. 73, pl. viii, fig. 30.

*Hab.*—P.G. Bushire, 6–10 fathoms, very rarely.

Conspicuous for its remarkably ventricose whorls, yellowish hue, and short spire. The shell is smooth, with no interstitial striation.

## TURBONILLA EMILLÆ, Melvill.

*Turbonilla (Pyrgostelis) Emiliæ*, Melvill, Proc. Malac. Soc., vol. ii, p. 115, pl. viii, fig. 20.

*Hab.*—I. Bombay (Abererombie).

A very small species (long. 2, lat. ·075 mm.), with no very leading features. It seems to be of the section *Pyrgiscus*, but shows a leaning towards the genus *Pyrgulina*, in its close ribs and interstitial striation.

TURBONILLA EUCTEANA,<sup>2</sup> n.sp. Pl. IV, Fig. 11.

*T. testa parva, attenuata, gracili, lævissima, pallide straminea, anfractibus 10, quorum duo apicales inversi, læves, vitrei, heterostrophi, cæteris regularibus, ad suturas impressis, haud ventricosis, undique arcte costatis, costis rectis, concinnis, lævibus, sub lente striis spiraliter obscurissimis interstitialiter præditis, costis ultimi anfractus numero*

<sup>1</sup> κολλώδης, flexuous, sinuous.

<sup>2</sup> ευκτέανος, graceful.

18-19 ad basim evanidis, apertura subrotunda, columella fere recta, simplice. Long. 4.50, lat. 1.25 mm.

*Hab.*—Bombay.

A very neat species, allied to *T. terebrina*, Melvill. Pale ochreous to straw colour, with very smooth and frequent riblets, quite straight and regular. With a powerful lens interstitial striæ are observable, but these are most obscure, and might be easily overlooked. The apical whorls are inversely planorbiform. The general contour of the shell suggests a *Terebra* in miniature. But few examples have occurred in shell-sand.

*TURBONILLA EUMENES*,<sup>1</sup> n.sp. Pl. IV, Fig. 12.

*T. testa* minuta, delicata, rimata, attenuato-cylindrica, subpellucida, alba, anfractibus 7, quorum duo apicales heterostrophii, perlæves, depressoplanati, cæteris gradatulis, suturaliter impressis, undique longitudinaliter costulatis, costis fere rectis, lævibus, nitidis, striis interstitialibus arcte præditis, numero costarum anfractus ultimi circa viginti, apertura oblongo-ovata, peristomate tenui, columella simplice, paullum obliqua, dein versus basim recta. Long. 3.25, lat. 1 mm.

*Hab.*—Bombay, in shell-sand (Abercrombie).

A minute and most delicate species, perhaps not quite adult. The shining, smooth ribs, about twenty in number on the body-whorl, stand out prominently under a lens, in contrast with the somewhat coarse striæ, proportionately speaking. The whorls are gradate, nuclear whorls two, smooth, somewhat flattened. Columella simple. I do not know a species similar, unless it be *T. neogila*, also described in this paper, and, though not quite sure of the location, place it with some confidence amongst the *Turbonillæ*, section *Pyrgiscus*, Phil.

*TURBONILLA FRATERNA*, n.sp. Pl. IV, Fig. 13.

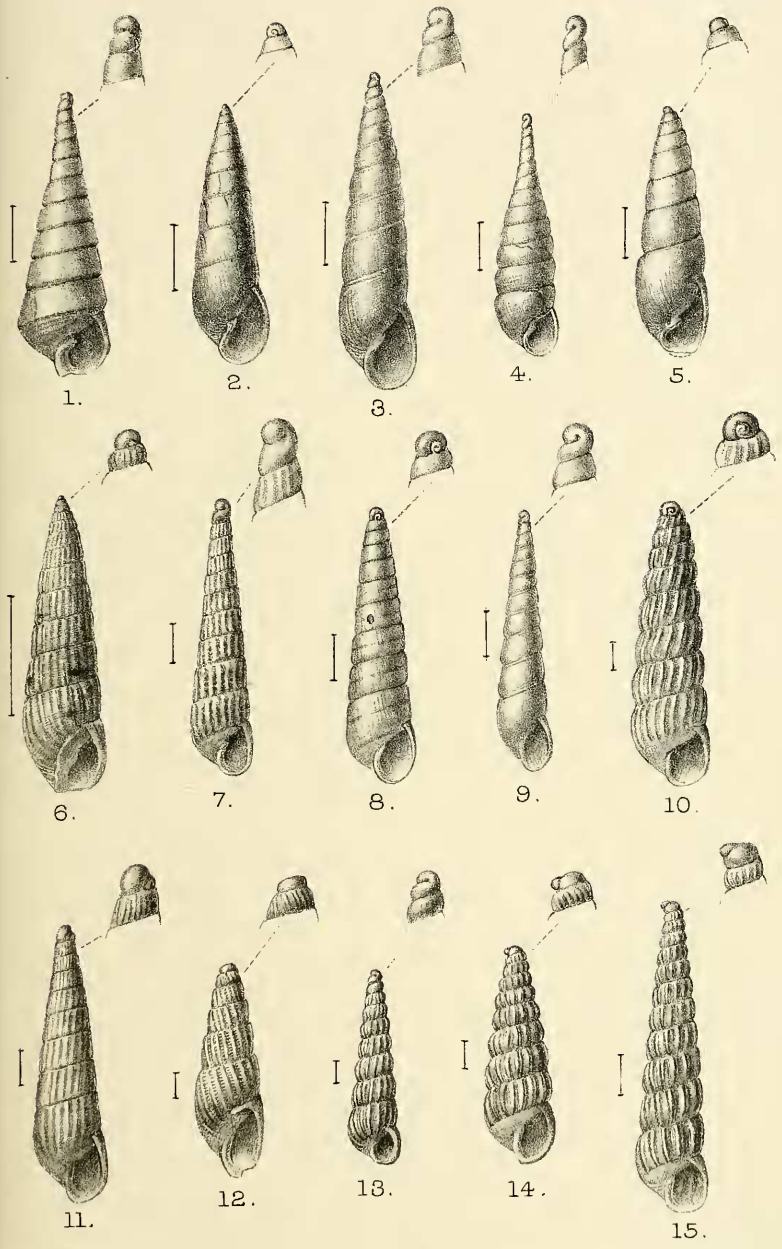
*T. testa* aciculata, minuta, angustissima, alba, delicata, anfractibus 10, quorum duo apicales bulbosi, heterostrophii, cæteris ad suturas multum impressis, ventricosulis, undique longitudinaliter lævicostatis, interstitiis lævibus, apertura fere rotunda, peristomate paullum in-crassato, columella simplice. Long. 3, lat. .075 mm.

*Hab.*—P.G. Gulf of Oman, lat. 24° 58' N., long. 56° 54' E., 156 fathoms.

An abundant *Turbonilla* in the above most prolific dredging, but not yet noticed from elsewhere, this little shell was at first considered a variety of *T. basilica*, Melv., which is by no means so graceful a shell, being more cylindrical in form and with different character of ribs. With the exception of *T. angustissima*, it is the narrowest species in proportion to its length known from this region. It is allied to *T. delicata*, Monter., from the South Mediterranean, Algiers, etc.

<sup>1</sup> εὐμένης, acceptable.





A. H. Searle, del et lith.

Huth, imp.

PYRAMIDELLIDÆ FROM THE PERSIAN GULF, ETC.



TURBONILLA GALACTODES,<sup>1</sup> n.sp. Pl. IV, Fig. 14.

*T. testa* attenuato-conica, gracili, parva, alba, anfractibus 9–10, quorum apicales heterostrophi, planorbuli, læves, cæteris ad suturas impressis, ventricosis, rotundatis, arcuissime costatis, costis incrassatis, lævissimis, nitidis, ultimum apud anfractum infra peripheriam ad basim evanidis, interstitiis omnibus lævibus, numero costarum ultimi anfractus circa 28, apertura magna, ovata, peristomate fere continuo, columella simplicè. Long. 3·50, lat. 1 mm.

*Hab.*—P.G. Gulf of Oman, lat. 24° 58' N., long. 56° 54' E., 150 fathoms.

A species not very easy to define as regards its precise limitations. For the type we take a shell with rounded whorls, ornamented with thickened close longitudinal ribs, these ribs fairly straight, the interstices being smooth. Some specimens dredged in live but not mature condition are nearly allied to this, and these were provisionally identified as *T. tenuicosta*, Issel, an Erythræan species, but are distinct. They came from lat. 25° 24' N., long. 57° 27' E., 243 fathoms, sand and mud, and we expect, though the ribs are slightly more flexuose, that they are identical with *T. galactodes*.

## TURBONILLA HERMIA, Melvill.

*Turbonilla Hermia*, Melvill, Proc. Malac. Soc., vol. vii, p. 74, pl. vii, fig. 11.

*Hab.*—P.G. Gulf of Oman, lat. 24° 58' N., long. 56° 54' E., 156 fathoms.

Allied to *T. Abererombiei*, *T. Michaelis*, and *T. galactodes*, the last two being described in this paper, this species will be known from all by its compact substance and form, the very fine interstitial striations being another distinguishing characteristic, though this feature is almost, if not quite, obsolete in some specimens. It is locally an extremely abundant species, very closely and somewhat flexuously ribbed, ten or eleven whorled, the nuclear whorls planorbiform, and when once distinguished is easy to recognize.

TURBONILLA ICELA,<sup>2</sup> n.sp. Pl. IV, Fig. 15.

*T. testa* parva, aciculata, pergracili, delicata, tenui, pellucente, albo-lactea, anfractibus 10–11, quorum apicales pupæformes, inversim heterostrophi, conspicui, cæteris ad suturas multum impressis, ventricosis, longitudinaliter obliquicostatis, costarum numero anfractus ultimi ad 21, infra peripheriam ad basim evanidis, apertura ovata, peristomate fere continuo, columella simplicè. Long. 5·50, lat. 1·20 mm.

*Hab.*—P.G. Gulf of Oman, lat. 24° 58' N., long. 56° 54' E., 156 fathoms, shell-sand; Bushire.

M.C. Charbar, 40 fathoms.

A very abundant species in the first and last of the above-mentioned localities, and confounded with *T. sororia*, Melv., from Bombay till very recently. Its graceful form, milky-white colour, and very

<sup>1</sup> γαλακτώδης, milky white.

<sup>2</sup> εἴκελος, like, similar.

pronounced pupiform nuclear whorls distinguish it from its congeners. It evidently belongs to the sub-genus *Nisiturris*, Dall & Bartsch. I am obliged to Mr. Edgar Smith for first calling my attention to the distinctness of this species from *sororia*.

TURBONILLA INÆQUALIS, Melvill.

*Turbonilla inæqualis*, Melvill, Proc. Malac. Soc., vol. vi, p. 162, pl. x, fig. 10.

*Hab.*—P.G. Gulf of Oman, lat. 24° 58' N., long. 56° 54' E., 156 fathoms, shell-sand.

Quoting from the original description, this shell exhibits a peculiarity in the presence of pseudo-varices, these being simply unequally effuse longitudinal ribs. The whole surface of the shell is remarkably smooth, white, and shining, the mouth a perfect oval, and the heterostrophe nuclear whorls glassy, globular, and completely reversed. It is a rare species, and we have not seen more than twenty specimens.

TURBONILLA JULIA, n.sp. Pl. V, Fig. 1.

T. testa attenuata, gracillima, solidiuscula, straminea, anfractibus ad 12, quorum apicales 2 heterostrophi, bulbosi, vitrei, cæteris fere rectis, nequaquam tumidis, apud suturas impressis, undique recticostatis, interstitialiter spiraliter rudistriatis, costis crassis, numero ultimum apud anfractum circa 22, infra peripheriam fere evanescentibus, apertura subrotunda, peristomate fere continuo, columella recta, simplice. Long. 6·5, lat. 1·5 mm.

*Hab.*—Dredged south of Astola Island, 90 fathoms.

A species as yet rarely found, yellowish in hue, with almost straight whorls, and straight, thick, smooth ribs, the interstices being coarsely spirally striate. The species is in general build rather like the larger *T. candida*, Folin, but differs in colour, smaller size, and spiral striation.

TURBONILLA LINJAICA, Melvill & Standen.

*Turbonilla Linjaica*, Melvill & Standen, Proc. Zool. Soc., pt. ii, p. 393, pl. xxii, fig. 23, 1901.

*Hab.*—P.G. Linjah, 3½ fathoms, sand.

A very small rufous species, though a few specimens have occurred pure white. The ribs are nearly straight, acute, crowded, interstitially closely striatulate. The whorls are 9–10, with apex bulbous, rufous, impressed at the sutures, and tumescent. It only occurred in one dredging, in December, 1900.

TURBONILLA MANORÆ, Melvill.

*Turbonilla (Pyrgostelis) Manoræ*, Melvill, Mem. Manch. Soc., vol. xlii, No. 4, p. 23, pl. i, fig. 22.

*Pyrgulina Manoræ*, Melvill, Ann. Mag. Nat. Hist., vol. xii, pl. xxii, fig. 5, 1903.

*Hab.*—I. Manora, Karachi.

This so exactly resembles a *Pyrgulina* with a simple columella, however, that I suggested seven years ago its removal to that genus.

I replace it now among the *Turbonillæ*, considering it well harmonizes with the members of the sub-genus *Pyrgiscus*, Phil.

It occurred plentifully in one dredging of Mr. Townsend, but, so far as I am aware, only once. It is eight-whorled, white, delicate, longitudinally straightly ribbed, ribs smooth, interstices finely spirally filostriate, mouth roundly ovate, outer lip slightly effuse, columella straight. It seems nearly allied to *Chrysallida mumia*,<sup>1</sup> A. Adams, from Japan, lately relegated by Dall & Bartsch to the section *Pyrgiscus* of *Turbonilla*.<sup>2</sup>

*TURBONILLA MICHAELIS*, n.sp. Pl. V, Fig. 2.

T. testa parva, gracillima, attenuata, nitida, albo-lactea, tenuicula, anfractibus ad 11, quorum duo apicales inversim planorbuli, heterostrophi, cæteris gradatulis, ad medium paullum constrictis, omnino lævissimis, costis crassis, nitidis, supra juxta suturas spiralliter gemmulatis, ultimi anfractus numero 20, apertura ovata, peristomate supra obtuse angulato, fere continuo, columella recta, simplice.

Long. 4, lat. 1.25 mm., sp. maj.

„ 3, „ 1 „ „ min.

*Hab.*—P.G. Gulf of Oman, lat. 25° 10' N., long. 60° 34' E., 45 fathoms; also lat. 25° 39' N., long. 57° 19' E., 110 fathoms, and the dredging, so often quoted, contiguous to this, at 156 fathoms.

M.C. Off Charbar, 40 fathoms.

A very graceful and beautiful little species, of ornate architecture. In addition to the two inversely heterostrophe nuclear whorls there are nine, elaborately decorated with proportionately thick, smooth, shining ribs, the interstices being likewise smooth. The slight median constriction tends to the gemmulate appearance of the ribs just below the sutures. The peristome is obtusely angled at the upper part, and almost continuous. Columella simple. Named after my grandson, Michael Ernest Melvill.

*TURBONILLA MICROPERONE*, Melvill.

*Turbonilla microperone*, Melvill, Proc. Malac. Soc., vol. vi, p. 162, pl. x, fig. 11.

*Hab.*—P.G. Gulf of Oman, lat. 24° 58' N., long. 56° 54' E., 156 fathoms, shell-sand.

A somewhat incrassate species, to be known from its congeners in these seas by the flexuous, thick, oblique ribs, which are not of a very pronounced character. This species has only rarely occurred.

*TURBONILLA NEOGILA*,<sup>3</sup> n.sp. Pl. V, Fig. 3.

T. testa attenuato-oblonga, nitida, delicata, pallide stramineo-alba, anfractibus 7, quorum 2½ apicales, parvi, vitrei, heterostrophi, cæteris leniter gradatulis, fere rectis, delicate et arcte longitudinaliter striato-costatis, interstitiis tenuiter striatulis, ultimo anfractu prolongato,

<sup>1</sup> Ann. Mag. Nat. Hist., vol. vii, p. 45, 1861.

<sup>2</sup> Proc. U.S. Nat. Mus., vol. xxx, p. 343, pl. xvii, fig. 1.

<sup>3</sup> νεόγυλος, newly introduced.



cæteros magnitudine fere exæquante, costis infra basim continuis, apertura ovata, peristomate tenui, columella simplicè. Long. 3·25, lat. 1 mm.

*Hab.*—Bombay (Abercrombie).

A very delicate little species, very finely longitudinally lirately ribbed, ribs close, interstices also finely striate. Our specimens are slightly beach-worn.

TURBONILLA OLIGOPLEURA,<sup>1</sup> n.sp. Pl. V, Fig. 4.

T. testa fusiformi, pellucida, albo-cornea, delicatula, lævi, anfractibus ad 8, quorum apicalis parvus, heterostrophus, cæteris ad suturas multum impressis, gradatulis, ad medium anfractuum paullum constrictis, undique paucicostatis, costis rectis, superne, spiraliter gemmulatis, ultimo anfractu fere evanidis, præcipue prope aperturam, apertura ovata, labro tenui, columella paullum incrassata, recta, simplicè. Long. 5, lat. 1·75 mm.

*Hab.*—P.G. Gulf of Oman, 198 fathoms, dredged alive, in various stages of growth.

An abbreviate form, thin, horny, white, that may not have attained a perfectly adult stage. It is conspicuous for its few ribs; around the last whorl there are not more than 14–15, and some of these are partly evanescent. We figure the most mature example; nine or ten others are smaller, and do not possess more than five whorls. In all, the nuclear whorls are somewhat small, globular, smooth, and white. We had in error supposed this to be *T. Vélaini*, Tryon = *scalaris*, Vélain, from St. Paul's Rocks.

TURBONILLA PACHYPLEURA,<sup>2</sup> n.sp. Pl. V, Fig. 5.

T. testa mediocri, incrassata, aciculato-attenuata, alba, rudi, anfractibus 12, quorum apicales duo vel tres reversi, heterostrophii, cæteris multum ad suturas impressis, tumidulis, undique lævicostatis, costis crassis, interdum varicosis, interstitiis lævibus, quarto, quinto, et sexto anfractibus arctissime costatis, ultimo infra peripheriam angulato, lævi, 15 costato, apertura ovata, peristomate incrassato, columella recta. Long. 8, lat. 2 mm.

*Hab.*—P.G. Gulf of Oman, lat. 24° 58' N., long. 56° 54' E., 156 fathoms.

One of the large and coarse species, quite smooth, twelve-whorled, including two or three nuclear, heterostrophe, and pupiform, the whorls are tumid, ribs thick, occasionally varixed, mouth oval, lip thickened, columella straight. It but rarely occurred in the above dredging.

TURBONILLA PHYLLIDIS, n.sp. Pl. V, Fig. 6.

T. testa pro genere conspicua, attenuata, pergracili, lævissima, candida, delicatula, anfractibus 16, quorum duo nucleares erecti, heterostrophii, bulbosi, vitrei, cæteris arcte longitudinaliter costulatis,

<sup>1</sup> ὀλιγοπλευρος, few ribbed.

<sup>2</sup> παχυπλευρος, thick-ribbed.

costis rectis, nitidis simul ac interstitiis lævissimis apud suturas, impressis, haud ventricosis, interne arcte spiraler lacteo-zonulatis, ultimo anfractu costis infra medium evanidis basi lævi, apertura ovata, peristomate paullum incrassato, columella recta. Long. 10, lat. 2 mm.

*Hab.*—P.G. Gulf of Oman, lat. 25° 13' N., long. 58° 40' E., 120 fathoms.

One of the most graceful and beautiful of the Eastern *Turbonilla*. The shell, unique at the present time, is without a flaw, and with its many whorls straitly ascending in regular series, the pellucid interstices reflecting the internal spiral striation presents an exquisite example of perfect symmetry.

TURBONILLA PUNCTILLUM,<sup>1</sup> n.sp. Pl. V, Fig. 7.

T. testa parva, aciculata, delicata, albo-ochracea, anfractibus 9½, quorum 2½ nucleares, bulbosi, heterostrophii, planorbuli, cæteris ad suturas impressis, subventricosis, lævibus, undique longitudinaliter costulatis, costis flexuosis, tenuibus, supra, juxta suturas spiraler et regulariter interstitialiter profunde punctatis, ad ultimum numero costarum circa 21, ad basim lævem, apertura parva, subrotunda, peristomate fere continuo, tenui, columella recta. Long. 4, lat. 1 mm.

*Hab.*—P.G. Gulf of Oman, lat. 24° 58' N., long. 56° 54' E., 156 fathoms, shell-sand.

Only one or two examples have occurred of this distinct species, very small, with thin flexuous longitudinal ribs, interstices smooth, but spirally punctate above, near the sutures, in one regular line throughout the whorls. The nucleus is bulbous, vitreous, and planorbiform.

TURBONILLA QUÆSTUOSA, n.sp. Pl. V, Fig. 8.

T. testa parva, aciculata, delicata, albo-lactea, subpellucida, tenui, lævi, anfractibus 9, duobus apicalibus parvis heterostrophis, cæteris ad suturas impressis, gradatulis, paullum tumidulis, undique obliquicostatis, costis anfractus ultimi flexuosis, versus basim fere vel omnino evanidis, apertura ovata, peristomate tenui, columella excavata. Long. 4, lat. 1 mm.

*Hab.*—Bombay (Abercrombie).

A delicate, thin *Turbonilla*, with oblique longitudinal costæ, which are flexuous on the body-whorl, and become almost in parts evanescent near the base. The whorls are impressed suturally, and shouldered. One interesting character consists in the costæ of the upper whorls ceasing a little way from the suture, leaving a narrow, smooth space. The shell is semi-transparent, milky white, and quite smooth, the surface being dull, and not shining as is so usual a character in the genus. From *T. tenuicosta*, Melvill, an Erythrean species, it would seem to differ in possessing nine whorls against six and a half, dulness against shining appearance, and other minor differences exist.

<sup>1</sup> *Punctillum*, a little dot.

## TURBONILLA RECTICOSTATA, Melvill.

*Turbonilla recticostata*, Melvill, Proc. Malac. Soc., vol. vi, p. 163, pl. x, fig. 12.

*Hab.*—P.G. Gulf of Oman, lat.  $24^{\circ} 58' N.$ , long.  $56^{\circ} 54' E.$ , 156 fathoms.

M.C. Charba, 40 fathoms.

A miniature of *T. candida*, Folin; the whorls are very slightly turreted, ribs straight and not many in number, 15 to 16 on the body-whorl. It is not one of the commoner species in the above dredgings.

## TURBONILLA SORORIA, Melvill.

*Turbonilla sororia*, Melvill, Proc. Malac. Soc., vol. ii, p. 114, pl. viii, fig. 17.

*Hab.*—I. Bombay (Abercrombie).

A whitish-ochre species, twelve or thirteen whorled, sub-pellucid, with ventricose whorls, straightly longitudinally costate, and with smooth interstices, ribs few in number, about twelve on body-whorl. The nuclear whorls are pupiform and expanded, so that it should be placed in the sub-genus *Nisiturris*, D. & B. I had considered *T. icela* the same species, and am obliged for Mr. Edgar Smith's opinion in this matter. All the localities given by me in a subsequent paper<sup>1</sup> should be removed, therefore, with the exception of Bombay, to which locality this species is at present confined. It appears, however, to be the commonest form found there.

## TURBONILLA STEGASTRIS, Melvill.

*Turbonilla stegastris*, Melvill, Proc. Zool. Soc., 1901, p. 393, pl. xxii, fig. 24.

*Hab.*—P.G. Gais (or Kais) Island.

I. Karachi.

A graceful shell, among the larger of the genus (long. 11, lat. 2·30 mm. sp. maj.), with many fine longitudinal riblets, spirally, as it were, interwoven with cross-threads, while just above the sutures runs one rufous thin spiral line. Whorls nine altogether.

## TURBONILLA SYKESII, n.sp. Pl. V, Fig. 9.

*T. testa minuta, conico-attenuata, delicata, nitida, alba, lævi, crystallina, anfractibus 9, quorum duo apicales reversi, læves, cæteris anguste ad suturas impressis, supra angulatis, undique arcissime lævicostulatis, costis rectis, interstitiis lævibus, ultimi anfractus flexuosis, infra medium evanidis, ad basim lævissime, apertura ovata, peristomate tenui, fere continuo, columella recta. Long. 2·75, lat. 1 mm.*

*Hab.*—P.G. Gulf of Oman, lat.  $24^{\circ} 58' E.$ , long.  $56^{\circ} 54' N.$ , 156 fathoms; lat.  $25^{\circ} 10' E.$ , long.  $60^{\circ} 34' N.$ ; off Charbar, 40 fathoms.

<sup>1</sup> Proc. Zool. Soc., 1901, p. 393.

Allied to *T. galactodes* and *T. Abercrombiei*, Melvill. One of the smaller species, but the elegance of its shining close whorls, subangled at the upper part, just by the sutures, aid in identifying it. Mr. E. R. Sykes kindly assisted me in the differentiation of this and other species, and I have pleasure in connecting this with his name.

TURBONILLA TEMPLARIS, Melvill. Pl. V, Fig. 10.

*Turbonilla (Pyrgostelis) templaris*, Melvill, Mem. Manch. Soc., vol. xlii, No. 4, p. 23, pl. i, fig. 6.

*Hab.*—P.G. Mussandam.

M.C. Charbar and Jask.

I. Karachi; Bombay (Abercrombie).

Slightly allied in form, but not in texture, to *T. scalaris*, Philippi, from the Mediterranean, this pretty species is one of the most marked of the Indian *Turbonillæ*, its gradate and tapering crystalline whorls, with straight smooth ribs and equally smooth interstices, being noteworthy. It is widely distributed, but so far has not been found at a greater depth than 10–15 fathoms. A variety occurs, with broader contour, wider mouth, and fewer longitudinal ribs, these being regularly gemmulate above, just below the sutures. These come from Bombay.

TURBONILLA TEREBRINA, Melvill.

*Turbonilla terebrina*, Melvill, Proc. Malac. Soc., vol. ii, p. 115, pl. viii, fig. 20.

*Hab.*—P.G. Gulf of Oman, 250 fathoms.

I. Karachi, amongst muddy rocks at low tide.

Bombay (Abercrombie).

A somewhat solid, shining shell, measuring 6 mm. longitudinally, the ribs smoothly rounded and interstices quite smooth, mouth oblong. Very like one of the genus *Terebra* in miniature. It appears fairly generally distributed, but never in much plenty or gregarious as are *icela*, *templaris*, and other species. Originally described from Bombay specimens.

TURBONILLA TOWNSENDI, n.sp. Pl. V, Fig. 11.

*T. testa attenuata, ad basim latiore, alba, nitida, anfractibus* 10½, quorum 2½ apicales valde bullati, pupiformes, heterostrophi, cæteris octo ventricosus, ad suturas impressis, undique longitudinaliter costatis, costis nitidis, lævibus, fere rectis, interdum, sed raro, varicosis, costis numero anfractus ultimi 18, undique interstitialiter arcte spiraliter liratis, apud basim, infra peripheriam, omnino evanidis, basi lævi, apertura quadrato-ovata, labro tenui, columella fere recta. Long. 6, lat. 1.75 mm.

*Hab.*—Gulf of Oman. M.C. Off Charbar, 44 fathoms.

Distinguished by its somewhat broad base, being 10–11 whorled, of which the nuclear are much inflated, smooth, milky-vitreous, the coils reversedly turned over, the eight principal whorls being homogeneous, impressed suturally, somewhat ventricose, straightly longitudinally ribbed. The ribs are fine, shining, smooth, with the interstices

uniformly closely striolate, mouth squarely oval, columella straight, base plain, smooth. Named in honour of Mr. Frederick W. Townsend.

*TURBONILLA UNICINCTA*, n.sp. Pl. V, Fig. 12.

*T. testa* aciculata, gracillima, angusta, delicata, alba, anfractibus ad 13, quorum  $2\frac{1}{2}$  apicales bulbosi, planorbuli, heterostrophii, cæteris ad suturas multum impressis, ventricosis, longitudinaliter ante obliquicostatis, interstitiis microscopice spiraliter delicatissime striatulis, ultimi costis numero ad 32, trans basim extensis, ad medium trium anfractuum ultimorum læte et anguste zona rufo-brunnea decoratis, apertura rotunda, peristomate tenui, columella paullum excavata. Long. 5.50, lat. 1.25 mm.

*Hab.*—M.C. Off Charbar, 40 fathoms.

A very select, delicate, and graceful species, of which we have seen only one, but very perfect example. It is white, thin, attenuate, the heterostrophe nuclear whorls smooth, bulbous, turned over at right angles, the rest being ventricose, very closely obliquely ribbed, the interstices microscopically finely striate. The three lowest whorls are narrowly banded with a thin rufous brown zone in the centre.

*TURBONILLA ZETEMIA*,<sup>1</sup> n.sp. Pl. V, Fig. 13.

*T. testa* multum attenuata, parva, rudi, pallide straminea, anfractibus 11, quorum  $2\frac{1}{2}$  nucleares planorbuli, heterostrophii, vitrei, tumiduli, cæteris ad suturas impressis, ventricosulis, undique longitudinaliter costatis, costis rudibus, lævibus, nitidis, incrassatis, numero anfractum apud ultimum circa 14, hic illic crassi-varicosis, interstitiis spiraliter striatis, apertura parva, subrotunda, labro paullum crassiusculo, basi lævigata, columella recta. Long. 5, lat. 1 mm.

*Hab.*—P.G. Gulf of Oman, lat.  $24^{\circ} 58' N.$ , long.  $56^{\circ} 54' E.$ , 156 fathoms, shell-sand.

A small species, of which we have seen but very few specimens, and none of them in good condition. Its principal characteristics are the few but coarse incrassate ribs, with interstitial—also rather coarse striation; a few varices are likewise found here and there. The base is smooth, mouth small, peristome slightly thickened. *T. Townsendi* is of the same character but a much stouter and broader shell, and *T. pachypleura* may be compared.

N.B. Several other *Turbonilla* live in these seas, judging from various insufficient fragments that have occurred in shell-sand and other dredgings, and it is probable that but a tithe of the number that exist have been catalogued at the present opportunity.

*MUMIOLA CARBASEA*, Melvill.

*Mumiola carbacea*, Melvill, Journ. Malac., vol. xi, p. 83, pl. viii, fig. 12.

*Hab.*—P.G. Gulf of Oman, lat.  $24^{\circ} 58' N.$ , long.  $56^{\circ} 54' E.$ , 156 fathoms.

Like *M. spirata*, Ad., in miniature, but of thinner, papyraceous texture.

<sup>1</sup> ζήτημα, a thing sought out.



## MUMIOLA EPIBATHRA, Melvill.

*Mumiola epibathra*, Melvill, Proc. Malac. Soc., vol. vii, p. 72, pl. vii, fig. 5.

*Hab.*—P.G. Gulf of Oman, lat. 24° 58' N., long. 56° 54' E., 156 fathoms, shell-sand.

The flattened base of this unique shell is somewhat peculiar. The mouth is likewise proportionately small, and the whorls very markedly gradate. It may possibly be ultimately relegated to the *Pyrgiscus* section of *Turbonilla*, but, though somewhat anomalous, we think it bears an affinity to *M. spirata*, Ad.

## MUMIOLA SPIRATA (A. Adams).

*Parthenia spirata*, A. Adams, Ann. Mag. Nat. Hist., vol. vi, p. 414, 1860.

*Monoptygma spirata* (A. Adams), Sowerby, Thes. Conch., pl. clxxii, figs. 26, 27.

*Hab.*—P.G. Bushire, Mussandam.

M.C. Charbar, Gwadûr, Ormara.

I. Karachi.

The type of the genus, and not usually showing much variation, but a very elongate form, with one or two more whorls, and narrower proportionately, was dredged off Mussandam. These specimens have an olivaceous epidermis, and may perhaps be distinct.

## CINGULINA ARCHIMEDEA, Melvill.

*Cingulina archimedeae*, Melvill, Proc. Malac. Soc., vol. ii, p. 115, pl. viii, fig. 2.

*Hab.*—I. Bombay (Abercrombie).

Since the original description was written, fourteen years ago, I have been shown by Mr. Abercrombie a great many examples, some measuring alt. 8.75, diam. 2 mm., thus much surpassing the type in magnitude. In all other respects the shells are the same.

## CINGULINA ISSELI (Tryon).

*Turbonilla (Cingulina) Isseli*, Tryon, Man. Conch., vol. viii, p. 339, pl. lxxvi, fig. 64.

*Eulimella cingulata*, Issel, Conch. Mar. Ross., p. 182 (*non* Dunker).

*Hab.*—P.G. Henjam Island, Dabai, Muscat, etc.

M.C. Charbar, most abundant.

I. Karachi, Manora Point. Found upon muddy weed-covered rocks at low water, and at 7 fathoms.

A somewhat protean species, and one which requires further study than it has yet received.

I am not sure that the true *C. spina*,<sup>1</sup> Crosse & Fisch., occurs in these seas. The only examples I have come from Australia. It was reported by Mr. Townsend from Karachi, but I have not seen specimens.

<sup>1</sup> Journ. de Conch., 1864, p. 347; id., 1865, p. 44, pl. iii, figs. 13, 14.

## OSCILLA FACETA, Melvill.

*Oscilla faceta*, Melvill, Journ. Malac., vol. xi, p. 82, pl. viii, fig. 10, 1904.

*Hab.*—P.G. Gulf of Oman, lat. 24° 58' N., long. 56° 54' E., 156 fathoms, shell-sand.

## OSCILLA EVANIDA, n.sp. Pl. V, Fig. 15.

*O. testa parva, fusiformi, anguste umbilicata, albocinerea, anfractibus 8, quorum duo apicales depressi, fere immersi, cæteris apud suturas impressis, quinque supernis duabus obtusis carinis præditis, ultimo simili modo sed obscure bicarinato, deinde versus basim evanido, apertura ovata, labro tenui, columella fortiter uniplicata. Long. 3.50, lat. 1.75 mm.*

*Hab.*—Karachi.

A somewhat aberrant *Oscilla*, but I am at a loss where otherwise to place it. The two apical whorls are somewhat depressed and inconspicuous, the five next in order uniformly bicarinate, the keels very conspicuous; the body-whorl is more obscurely keeled, but becomes almost smooth ultimately towards the base, and from this circumstance the trivial name has been suggested. *O. mirabilis*, Preston, from Ceylon, a more acutely keeled species, is akin to *O. evanida*.

## OSCILLA INDICA, Melvill.

*Oscilla indica*, Melvill, Proc. Malac. Soc., vol. ii, p. 112, pl. viii, fig. 5.

*Hab.*—M.C. Charbar, 40 fathoms.

I. Bombay (Abercrombie); Karachi.

Not an uncommon species in these seas, almost always occurring in company with the similar *Irawadia trochlearis*, Blanf., as well as with *O. tornata*. It has been found at Aden by Commander E. R. Shopland.

## OSCILLA JOCOSA, Melvill.

*Oscilla jocosa*, Melvill, Journ. Malac., vol. xi, p. 82, pl. viii, fig. 11; Dautzenberg & Fischer, Journ. de Conch., vol. liv, p. 181, pl. vii, figs. 6, 7, 1907.

Occurred with *O. faceta*, both being of uncommon occurrence.

## OSCILLA TORNATA, Melvill.

*Oscilla tornata*, Melvill, Mem. Manch. Soc., 1893, p. 8, pl. i, fig. 12.

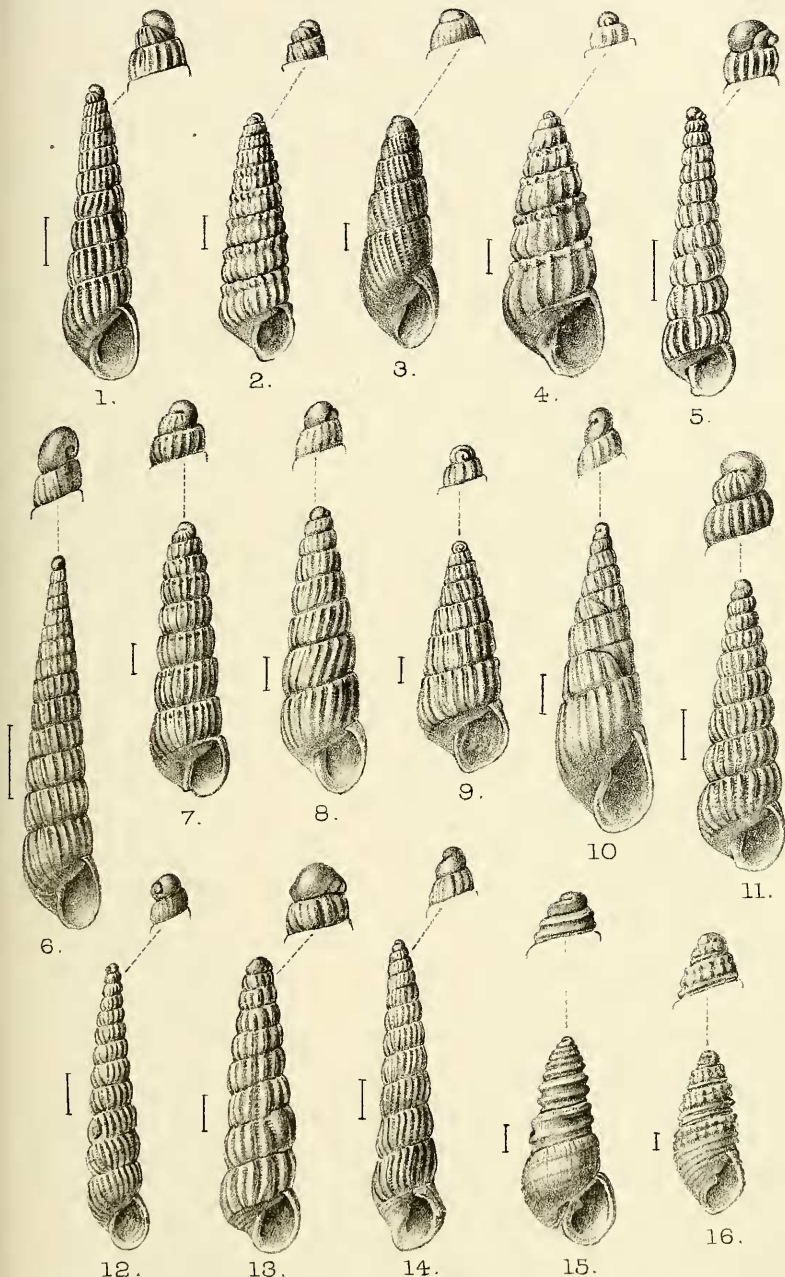
*Hab.*—M.C. Charbar, 7–40 fathoms.

I. Karachi, common; Bombay (Abercrombie).

I cannot follow Dall & Bartsch in making *Oscilla*,<sup>1</sup> A. Ad., subservient to *Cingulina*, A. Ad.<sup>2</sup> The columellar plication of the former is a conspicuous feature.

<sup>1</sup> Proc. Zool. Soc., 1867, p. 310.

<sup>2</sup> Ann. Mag. Nat. Hist., 1860, p. 414.



A.H. Searle, del. et lith.

Huth imp

PYRAMIDELLIDÆ FROM THE PERSIAN GULF, ETC.



## MIRALDA DIADEMA (A. Adams).

*Parthenia diadema*, A. Adams, Ann. Mag. Nat. Hist., vol. v, p. 479, 1860.

*Odostomia (Miralda) diadema*, A. Ad., op. cit., p. 321; Dall & Bartsch, Proc. U.S. Nat. Mus., vol. xxx, p. 356, pl. xvii, fig. 2.

*Actæopyramis brevicula*, Melvill & Standen, Ann. Mag. Nat. Hist., vol. xii, pl. xxii, fig. 14, 1903.

*Hab.*—P.G. Gulf of Oman, lat.  $24^{\circ} 58' N.$ , long.  $56^{\circ} 54' E.$ , 156 fathoms, shell-sand.

I. Karachi, 7 fathoms.

From the dredging in the Gulf of Oman come the narrow forms named *brevicula*, which, I have no doubt, are identical with those called *diadema* from Karachi.

## MIRALDA GEMMA (A. Adams).

*Chrysallida gemma*, A. Adams, Ann. Mag. Nat. Hist., vol. viii, p. 302, 1861.

*Odostomia (Miralda) gemma* (A. Ad.), Dall & Bartsch, Proc. U.S. Nat. Mus., vol. xxx, p. 356, pl. xxii, fig. 1.

*Hab.*—I. Karachi.

I identify this, with little doubt, from three Japanese specimens in my collection collected by Dr. Arthur Adams, and the admirable figure, reference to which is given above.

## MIRALDA IDALIMA, Melvill. Pl. V, Fig. 16.

*Miralda idalima*, Melvill, Proc. Malac. Soc., vol. ii, p. 112, pl. viii, fig. 6.

*Hab.*—P.G. Bushire (?).

I. Bombay (Abercrombie).

The type is now refigured, as the first did not give details correctly. I cannot now find any Bushire specimens, and think most likely they belonged to *M. gemma*, A. Ad. If this be so, the type is unique, for the other example that was found in Bombay shell-sand at the same time, was soon mislaid, and never reappeared.

## MIRALDA IMA (Melvill).

*Odostomia (Miralda) ima*, Melvill, Proc. Malac. Soc., vol. vii, p. 75, pl. vii, fig. 15.

*Hab.*—P.G. Gulf of Oman, lat.  $24^{\circ} 58' N.$ , long.  $56^{\circ} 54' E.$ , 156 fathoms, in shell-sand.

The type of this species, now in the British Museum, is well figured, and exhibits the penultimate whorl with two, the body-whorl with three spiral beaded rows, followed by a strong keel. With it occurred what at the time I considered the same species, with only two beaded rows on the last whorl, and these agree, as Mr. Hedley has pointed out,<sup>1</sup> with his *Pyrgulina umeralis* from Princess Charlotte Bay, North Queensland (J. Brazier).

<sup>1</sup> Proc. Linn. Soc. N.S.W., 1902, p. 11, pl. iii, fig. 32.

## MIRALDA LÆTITIA (Melvill &amp; Standen).

*Actæopyramis lætitia*, Melvill & Standen, Ann. Mag. Nat. Hist., vol. xii, p. 303, pl. xxii, fig. 4, 1903.

*Odostomia (Miralda) lætitia* (Melv. & Stand.), Proc. Zool. Soc., vol. ii, p. 396, 1901.

*Hab.*—P.G. Gulf of Oman, lat. 24° 58' N., long. 56° 54' E., 156 fathoms, shell-sand.

A pretty nodulous species, like *Act. granulata*, Ad., in miniature.

## MIRALDA OPEPHORA, Melvill. Pl. VI, Fig. 1.

*Miralda opephora*, Melvill, Mem. Manch. Soc., vol. xlii, No. 4, p. 21, pl. i, fig. 7.

*Hab.*—M.C. Charbar, 40 fathoms.

I. Karachi.

I refigure this species, which is conspicuous for its quadrate decussate interstices and delicate spiral basal striation.

## MIRALDA UMERALIS (Hedley).

*Pyrgulina umeralis*, Hedley, Proc. Linn. Soc. N.S.W., 1902, p. 11, pl. iii, fig. 32.

*Odostomia humeralis*, Hedley, Proc. Linn. Soc. N.S.W., vol. xxxiv, p. 446, 1909.

*Hab.*—P.G. Gulf of Oman, lat. 24° 58' N., long. 56° 52' E., 156 fathoms, shell-sand.

See remarks under *M. ima*. This shell was described first as *umeralis*, perhaps by a *lapsus calami*, in which case the emended version might be allowed to stand. *Pyrgulina Zea*, Hedley,<sup>1</sup> judging by the figure, seems similar, but here in the penultimate whorl the lower keel is beaded. We do not yet know to what extent this species and its allies vary *inter se*.

## PYRGULINA (EGILINA) CALLISTA, Melvill.

*Pyrgulina callista*, Melvill, Mem. Manch. Soc., 1893, pt. v, fig. 13.

*Hab.*—P.G. Kishm Island, 5 fathoms.

Mussandam, 47 fathoms.

M.C. Charbar. At low tide amongst mud and weed in loose rocks.

I. Karachi, rather common, dredged at 7 fathoms, alive, with many other small shells.

Bombay (Abercrombie).

This very select little species was originally described from specimens extracted from shell-sand gathered by Mr. Alexander Abercrombie in Bombay Harbour. The measurements are—

Long. 4, lat. 1.25 mm., sp. maj.  
 ,, 3.10 ,, 1 ,, ,, min.

It belongs to the group of which the type is *P. (Egilina) Mariella*,<sup>2</sup> A. Adams, from Japan, lately redescribed and refigured<sup>3</sup> by

<sup>1</sup> Proc. Linn. Soc. N.S.W., 1902, pl. iii, fig. 34.

<sup>2</sup> Ann. Mag. Nat. Hist., vol. vi, p. 415, 1860.

<sup>3</sup> Proc. U.S. Nat. Mus., vol. xxx, p. 354, pl. xxii, fig. 4.



Messrs. Dall & Bartsch, authors of the subgeneric title *Egilina*. I have specimens of *P. Mariella* in my own collection from Dr. A. Adams' Japanese gatherings; these show it to be of much the same build as *P. callista*, but smaller, sutural canaliculations not so sharply defined, lip not so squarrose, basal keels less pronounced. The specimens redescribed by Dall & Bartsch measure thus: long. 1·8, diam. 1 mm. Mine are a little larger, say  $2 \times 1$  mm.

I believe that several species described of late years should be either merged with *Mariella* or *callista*, or placed in the same sub-genus. Imprimis, *Odontostomia (Pyrgulina) Mayi*, Tate,<sup>1</sup> from D'Entrecasteaux Channel, Tasmania, of which I possess a co-type, is exceedingly near; the only distinguishing mark I can find, judging from my specimens, is that the costæ are not so oblique as in *P. callista*.

*Pyrgulina perspectiva*, Hedley,<sup>2</sup> judging from figure and description, I consider identical with young examples of *P. callista*, obtained at Bombay. These are interstitially spirally striate. In all the more mature examples this striation seems quite obsolete. And likewise *Pyrgulina Bartschi*, Dautz. & Fisch.,<sup>3</sup> a species intermediate in size, seems nearer to *P. callista* than to *P. Mariella*, both as regards character of ribs and subangulate mouth, and I consider it a synonym.

PYRGULINA (EGILINA) CÆLATA, A. Adams.

*Pyrgulina cælata*, A. Adams, Journ. Linn. Soc., vol. vii, p. 4; Ann. Mag. Nat. Hist., 1861, p. 303.

*Turbonilla (Babelis) cælator*, Dall & Bartsch, Proc. U.S. Nat. Mus., vol. xxx, p. 347, pl. xvii, fig. 9.

*Hab.*—I. Karachi.

A larger shell than *P. callista* in all its parts, in addition to which, owing to a median constriction of whorl, the ribs assume a slightly beaded appearance on either side of the sutures. Otherwise, the characters of sculpture are much the same. It is well figured by Dall & Bartsch (loc. cit., pl. xvii, fig. 9), but we cannot quite understand why it was placed in the genus *Turbonilla*, with a new sub-genus (*Babelis*) specially constructed for it; the columellar plait is strongly developed, and the sculpture and general build harmonize throughout with *Egilina*. The type is Japanese.

PYRGULINA (EGILINA) CHASTERIANA, n.sp. Pl. VI, Figs. 2, 2a.

*P. testa parva, conico-fusiformi, tenui, olivaceo-alba, anfractibus 7, quorum apicales 2 vitrei—in nostro unico specimine fracti—cæteris ad suturas haud profunde canaliculatis, undique longitudinaliter costatis, costis anfractus apud supernos rectis, penultimo et ultimo obliquis et flexuosis, interstitiis lævibus, ultimo anfractu infra peripheriam ad basim acute sulcato, sulcis ad 6, et decussato, interstitiis quadratis, apertura magna, ovato-oblonga, labro tenui, columella leniter uniplicata. Long. 3·50, lat. 1·25 mm.*

<sup>1</sup> Trans. Roy. Soc. S. Australia, 1898, p. 84, pl. ii, fig. 6.

<sup>2</sup> Proc. Linn. Soc. N.S.W., pt. i, p. 10, pl. iii, fig. 33, 1902.

<sup>3</sup> Journ. de Conch., vol. liv, p. 191, pl. vii, fig. 1.

*Hab.*—P.G. Gulf of Oman, lat. 24° 58' N., long. 56° 54' E., 156 fathoms, shell-sand.

The nearest approximation to this species is to be found in *P. glycisma*; the mouth, however, is proportionately smaller in that species, the sutures are not so impressed, the sculpture at the base quite different, and the columellar plait is only lightly expressed in *P. Chasteriana*.

I name this beautifully decorated little shell in memory of one for whom the Pyramidellidæ possessed a great and lasting fascination, as exemplified by the close and especial study he had given for years to the British and Mediterranean forms of *Eulimella*, *Turbonilla*, and *Odostomia*.

Dr. George William Chaster, of Southport, passed away after an illness of only three days, on May 5 last, at the early age of 47, widely mourned and deeply regretted by all who knew him. It is a great satisfaction to think that his valuable collections of natural history, ethnology, etc., are to remain intact, having been purchased *en bloc* by Dr. W. Evans Hoyle, Director of the Welsh National Museum, Cardiff, for the benefit of that institution.

PYRGULINA (EGILINA) GLYCISMA, Melvill.

*Pyrgulina glycisma*, Melvill, Ann. Mag. Nat. Hist., vol. iv, p. 95, pl. i, fig. 16, 1899.

*Hab.*—P.G. Bushire.

I. Karachi.

Since the description of this interesting species larger examples have come to hand, measuring long. 4, lat. 1.35 mm. Besides this there is nothing to add to what has already been said. No immediate ally seems to exist, if we except *P. Claudoni*, Dautz. & Fisch.,<sup>1</sup> which so exactly, except in size (long. 2, diam. 1 mm.), corresponds, that we suspect it to be a non-adult state of it.

Sect. **Eupyrulina.**

PYRGULINA CASTA (A. Adams).

*Monoptygma casta*, A. Adams, Proc. Zool. Soc., 1851, p. 223.

*Hab.*—I. Bombay (Abercrombie); Karachi.

The specimens are mostly worn, and not very conclusive.

PYRGULINA COMACUM,<sup>2</sup> n.sp. Pl. VI, Fig. 3.

*P. testa parva, rimatula, oblonga, turrigo-gradatula, alba, nitida, papyracea, delicata, anfractibus 7, quorum duo læves, parum nitentes, globulosi, cæteris gradatis, undique longitudinaliter flexuoso-costulatis, superne, juxta suturas, gemmulatis, sub lente interstitialiter infra tristriatis, ultimo ad peripheriam, aliter lævissimo, apertura ovata, peristomate fere continuo, columella paullum reflexa, uniplicata. Long. 3.25, lat. 1.15 mm.*

<sup>1</sup> Journ. de Conch., vol. liv, p. 189, pl. vi, fig. 14.

<sup>2</sup> κώμακον, a delicacy.

*Hab.*—P.G. Gulf of Oman, lat. 25° 39' N., long. 57° 19' E., 110 fathoms.

A shining, flexuose-ribbed species, of some refinement and beauty. With aid of a 1 inch objective spiral interstitial lines, three in number, may be discovered at the base of the antepenultimate and penultimate whorls, and in the centre of the body-whorl, otherwise the shell is quite smooth, as are the ribs. These are spirally gemmulate just below the sutures.

PYRGULINA CRYSTALLOPECTA,<sup>1</sup> n.sp. Pl. VI, Fig. 4.

T. testa perminuta, anguste attenuata, fere recta, crystallina, delicatissima, anfractibus 8, quorum duo apicales rotundo-bulbosi, læves, cæteris nitidis, vitreis, impressis, ventricosulis, undique arcte longitudinaliter recte costulatis, costis juxta suturas spiraler gemmulatis, utrinque incrassatis, subcanaliculatis, interstitiis minute striatis, apertura fere rotunda, labro ad basim elongato, columella obliqua, plica obscurissima vel absente. Long. 2, lat. .75 mm.

*Hab.*—M.C. Charbar, 40 fathoms.

A small, vitreous, straight, very narrow *Pyrgulina*, with the whorls thickened on each side of the subcanaliculate sutures, the regular and close ribs are gemmulate above, just below the sutures, and the interstices between the ribs finely spirally striolate. The columella plait is obscure, though just below the orifice. In form a *Turbonilla*, but agreeing in many points with the genus to which we tentatively assign it.

PYRGULINA DECORATA (Philippi).

*Odontostomia decorata*, Phil., Zeitsch. für Malak., 1849, p. 29.

*Hab.*—I. Karachi; Bombay (Abercrombie).

I incline to the few specimens, all in worn and poor condition from the above localities, being rather this species than *P. interstriata*, Sowerby, which has its headquarters in New Caledonia.

PYRGULINA DAUTZENBERGI, n.sp. Pl. VI, Fig. 5.

P. testa perminuta, ovato-conica, nitida, alba, anfractibus ad 5, quorum apicales magni, bulbosi, heterostrophii, cæteris gradatulis, lævissimis, undique longitudinaliter rotundicostatis, costis nitidis, interstitiis lævibus, ultimo anfractu magis numerosis, circa 26, haud apud basim evanidis, apud peripheriam linea funiculari spiraler prædito, apertura ovata, peristomate fere continuo, crassiusculo, columella obliqua, fortiter uniplicata. Long. 2.5, lat. 1 mm.

*Hab.*—Bombay (F. W. Townsend).

A remarkably select *Pyrgulina*, though so very minute. The peristome being thickened and well formed, causes us to think it has attained its full growth. The ribs of the upper whorls are thicker, proportionately, and likewise not so numerous as those on the body-whorl, this being decorated with one spiral funicular line about the

<sup>1</sup> κρυσταλλόπηκτος, crystalline.

periphery, the ribs are likewise gemmulate just below the sutures. I dedicate this unique shell to M. Philippe Dautzenberg, of Paris, whose labours in the cause of malacological science, including the smaller, but no less beautiful forms of mollusca, are so fully recognized and appreciated by all students.

PYRGULINA ECCRITA,<sup>1</sup> n.sp. Pl. VI, Fig. 6.

*P. testa parva, rimata, cylindro-fusiforimi, alba, nitida, anfractibus 7½, quorum 2½ vitrei, læves, heterostrophi, apice ipso immerso-planato, cæteris quatuor ad suturas inciso-impressis, minime ventricosis, arcte longitudinaliter costulatis, costis, simul ac interstitiis, lævissimis, ultimo anfractu paullum elongato, apertura parva, subrotunda, labro effuso, columella uniplicata. Long. 5·75, lat. 2 mm.*

*Hab.*—M.C. Lat. 25° 10' N., long. 60° 34' E., off Charbar at 40 fathoms.

Much like *P. interstriata*, Sowerby, *decorata*, Philippi, or *Edgarii*, Melvill, but the interstices between the longitudinal ribs are, with the rest of the shell, quite smooth and shining. A few examples only.

PYRGULINA EDANA,<sup>2</sup> n.sp. Pl. VI, Fig. 7.

*P. testa minuta, ovata, nitida, albo-crystallina, lævicostata, delicata, anfractibus ad 5, quorum duo nucleares depresso-planati, heterostrophi, vitrei, cæteris apud suturas multum impressis, quasi-canaliculatis, penultimo et antepenultimo biangulatis, ad angulum spiraliter funiculo-liratis, nitide gemmulatis, ultimo ad peripheriam simili modo spiraliter gemmulato, etiam supra, infra suturas, numero costarum longitudinalinum ad 22, apertura subrotunda, parva, peristomate fere continuo, crassiusculo, columella obliqua, uniplicata. Long. 1·75, lat. 1 mm.*

*Hab.*—Bombay (F. W. Townsend).

A most refined, canaliculate species, smooth, both as regards the costæ and interstitially, the whorls five in number, two being apical, heterostrophe, the rest ventricose, suturally constricted, many ribbed, adorned with two lirate rows of spiral gemmules, one above, the other in the centre of the whorl. The mouth is roundish, peristome well formed and almost continuous, columella once plaited.

PYRGULINA EDGARII, Melvill.

*Pyrgulina Edgarii*, Melvill, Proc. Malac. Soc., vol. ii, p. 114, pl. viii, fig. 21.

*Hab.*—I. Karachi, very common, amongst mud, weed, and loose stones at low tide; Bombay (Abercrombie).

A small species, with rather coarse smooth ribs, and interstitial striation, shell bluntly cylindrical, varying a little in length and compactness.

<sup>1</sup> ἔκκριτος, select, set apart.

<sup>2</sup> ἔδανός, sweet.

## PYRGULINA EPENTROMA (Melvill).

*Rissoa epentroma*, Melvill, Proc. Malac. Soc., vol. ii, p. 110, pl. viii, fig. 23.

*Mumiola epentroma*, Melv., Proc. Zool. Soc., vol. ii, p. 392, 1901.

*Hab.*—I. Karachi, mud-covered rocks at low tide; Bombay (Abercrombie).

I am still diffident about the proper location of this species. It is pure white, compact, of some substance, rissoiform, with thickened rounded peristome, incrassate longitudinal ribs, interstitially striate, six-whorled, somewhat turreted, columella simple.

## PYRGULINA EPENTROMIDEA, Melvill.

*Pyrgulina epentromidea*, Melvill, Ann. Mag. Nat. Hist., vol. iv, p. 94, pl. i, fig. 15, 1899.

*Hab.*—P.G. Gulf of Oman, 25 fathoms in mud, lat.  $26^{\circ} 23' N.$ , long.  $54^{\circ} 53' E.$  Also very abundant at 156 fathoms.

A beautiful shining white little shell, with strong columellar plait, many ribbed, every part being smooth.

## PYRGULINA HERVIERIODES (Melvill).

*Odostomia (Pyrgulina) hervierioides*, Melvill, Proc. Malac. Soc., vol. vii, p. 74, pl. vii, fig. 12.

*Hab.*—P.G. Gulf of Oman, lat.  $24^{\circ} 58' N.$ , long.  $56^{\circ} 54' E.$ , 156 fathoms, shell-sand.

The ribs and interstices are quite smooth in this species, which in contour resembles *P. thelxinoæ* often occurring with it.

PYRGULINA MILICHA,<sup>1</sup> n.sp. Pl. VI, Fig. 8.

*P. testa perparva, cylindrica, solidiuscula, perlævi, nitida, anfractibus*  $5\frac{1}{2}$ , quorum duo apicales, læves, bulbosi, heterostrophi, cæteris apud suturas impressis, gradatulis, arcte et recte longitudinaliter costulatis, costis, simul ac interstitiis, lævibus, apertura anguste ovata, labro paullum effuso, columella uniplicata. Long. 2, lat. 1 mm.

*Hab.*—I. Karachi.

M.C. Charbar, 40 fathoms.

A very minute, compact, solidly built shell, very smooth, closely longitudinally straightly ribbed, ribs incrassate, interstices showing no striation. The nuclear whorls are large proportionately, heterostrophe, globular, white, the remaining whorls shouldered, and some specimens show signs of spiral gemmulation below the sutures. I have seen several examples, and consider that it occupies a somewhat isolated position in the genus.

PYRGULINA PIRINHELLA,<sup>1</sup> n.sp. Pl. VI, Fig. 9.

*P. testa perminuta, delicata, attenuata, cylindrica, angustissime rimata, alba, parum nitente, anfractibus 5-6, quorum duo heterostrophi, bulbosi, ad apicem ipsum deplanata, cæteris gradatulis, apud suturas*

<sup>1</sup> μείλιχος, ge. 4le.

<sup>2</sup> πείριος, a basket of wicker-work.



impressis, undique longitudinaliter obliquicostatis, interstitiis spiraliter arcu striatulis, ultimo anfractu ad basim, infra peripheriam evanidis, apertura ovata, peristomate fere continuo, incrassatulo, columella excavata, obscure plicata. Long. 2, lat. .50 mm.

*Hab.*—Off Karachi Harbour.

A very elegant but extremely small turreted species, near *P. tenerrima* and *thelxinoia*, Melv., or *Melvilli*, Dautz. & Fisch.<sup>1</sup> The smooth longitudinal ribs are proportionately thick, and the spiral interstitial striation well marked.

PYRGULINA POLEMICA, n.sp. Pl. VI, Fig. 10.

*P. testa* minutissima, tenui, alba, nitida, delicata, anfractibus 4½, quorum apicales magni, bulbosi, lævissimi, cæteris tribus magnopere gradatulis, undique longitudinaliter costatis, costis anfractus ultimi circiter 16, interstitiis, simul ac costis, lævibus, anfractu ultimo ad medium spiraliter unilirato, costis apud suturas angulati, gemmulatis, crassiusculis, prominulis, apertura ovata, peristomate incrassato, extus supra unidenticulato, columella uniplicata. Long. 1.75, lat. .075 mm.

*Hab.*—Off Bombay (F. W. Townsend).

One of the minutest of shells, but very decided in design and character of contour. The sharp median line at the periphery of the body-whorl is noteworthy, the longitudinal ribs, fairly numerous, are beaded at the upper angle, and form an encircling coronal round the whorls. The nuclear whorls are large, proportionately speaking, bulbous, and smooth. Only two examples have been yet found.

PYRGULINA PYRGOMELLA, Melvill.

*Pyrgulina pyrgomella*, Melvill, Proc. Malac. Soc., vol. ii, p. 112, pl. viii, fig. 24.

*Odostomia (Pyrgulina) pyrgomella*, Melvill & Stauden, Proc. Zool. Soc., vol. ii, p. 396, 1901.

*Hab.*—I. Karachi, on rocks at low tide, very rare; Bombay (Abercrombie).

Specimens from the latter locality, now in the Manchester Museum, vary in size and length. Its conspicuous columellar plait distinguishes it from *Turbonilla templariss*, Melvill. Both these species are elegant scalariform shells.

PYRGULINA REDEMPTA, n.sp. Pl. VI, Fig. 11.

*P. testa* attenuata, turrito-gradata, alba, nitida, anfractibus ad 8, quorum apicales duo vitrei, bulbosi, heterostrophii, cæteris apud medium constrictis, longitudinaliter costulatis, costulis arctis, superficialibus, indistinctis, supra, apud suturas, spiraliter gemmulatis, ultimo anfractu fere recto, costulis infra peripheriam evanidis, versus basim lævi, nitido, apertura ovata, peristomate tenui, columella fortiter uniplicata. Long. 4, lat. 1 mm.

<sup>1</sup> Journ. de Conch., vol. liv, p. 185, pl. vi, fig. 10.



*Hab.*—P.G. Bushire; Mussandam.

I. Bombay.

Allied to, if indeed it be not an extreme variety of, *P. pyrgomella*, but the much larger number of lightly impressed longitudinal ribs, spirally gemmulate below the sutures, the smaller size, and straighter body-whorl serve to distinguish it. Singly, it has occurred in shell-sand at Bombay, whence comes the type figured, and at two places in the Persian Gulf.

PYRGULINA TENERRIMA (Melvill).

*Odostomia (Pyrgulina) tenerrima*, Melvill, Proc. Malac. Soc., vol. vii, p. 74, pl. vii, fig. 13.

*Hab.*—P.G. Gulf of Oman, lat. 24° 58' N., long. 56° 54' E., 156 fathoms, shell-sand.

Paucicostate, with gradate whorls, the broad intercostal spaces finely striate. It occurred very rarely, but could easily be overlooked, as it is one of the minutest species known. An error occurs in the original description, the interstices being given as smooth.

PYRGULINA THELXINOA (Melvill).

*Odostomia (Pyrgulina) thelxinoa*, Proc. Malac. Soc., vol. vii, p. 75, pl. vii, fig. 14.

*Hab.*—P.G. Gulf of Oman, with *P. tenerrima*, at 156 fathoms.

This minute shell is near *P. Sykesii*, Dautz. & Fischer, but with more frequent ribs, and the intercostal spaces not, therefore, so broad. The form is precisely similar, and measurements likewise.

PYRGULINA ZIDORA, n.sp. Pl. VI, Fig. 12.

*P. testa conico-fusififormi, rimata, solidula, sordide alba, anfractibus ad 7, quorum apicales heterostrophi, parvi, cæteris 5 longitudinaliter arcte reticostatis, ad suturas multum impressis, interstitiis lævibus, ultimo usque ad basim ipsam æque et regulariter costulato, apertura ovata, labro paullum effuso, margine columellari incrassato, fortissimo uniplicato. Long. 4.50, lat. 2 mm.*

*Hab.*—P.G. Mussandam, 50 fathoms, April, 1910.

An interesting species, with some leaning towards the typical section of the order, and we only describe it tentatively as a *Pyrgulina*, since at present it appears to come nearest to our *P. epentromidea*, the chief points of difference being in the much closer and more incrassate character of the ribs, and especially their continuance over the whole of the body-whorl, not being evanescent below the periphery, as in the case with the lighter and more superficial costæ of the older species. The columellar plait is in both species very strongly pronounced.

ODOSTOMIA ANABATHMIS,<sup>1</sup> n.sp. Pl. VI, Fig. 13.

*O. testa perparva, albo-lactea, ovato oblonga, lævigata, nitida, anfractibus 6, quorum duo apicales heterostrophi, cæteris gradatis,*

<sup>1</sup> ἀνάβαθμῖς, a stair, from the gradate whorls.